

# Rhodora

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### NEW SPECIES OF FERNS FROM CENTRAL AND SOUTH AMERICA

ROLLA TRYON

The following five new species have been recognized among specimens received for identification and during studies on the ferns of Peru.<sup>1</sup>

**Hemitelia conformis**, spec. nov.

FIG. 1

*Cnemidaria*; species *H. petiolatae* et *H. Woronovii* affinis; caulis ad 8 m. altus petiolus basaliter spinosus lamina bipinnata pinnae imparipinnatae pinnulae petiolulatae articulatae crenatae vel pinnatilobatae pinnula terminalis articulata productione laterali infra articulum venae plerumque liberae areolis costalis infrequentibus indusium inferius squamoideum.

TYPUS: Piñas Bay, Prov. Darién, Panama, June 26, 1957, *W. L. Stearn & K. L. Chambers 188* (GH); isotypi: ( US, Y).

*Hemitelia conformis* is evidently closely related to both *H. petiolata* Hook. and *H. Woronovii* Maxon & Morton. It differs from them in its imparipinnate pinnae, each having a conform, stalked and articulate terminal pinnule and in the few costal areolae of the pinnules. The latter two species have the apex of the pinna formed of several gradually reduced and confluent segments and lobes, and the veins of the pinnules regularly join to form costal areolae. All three species are arborescent but *H. conformis* is evidently the tallest of them.

<sup>1</sup> The drawings have been made by Mr. Johannes von Gumpfenberg and the photographs by Mr. Richard van Frank.

It is also related to *H. dissimilis* Morton from which it differs, among other characters, in the articulate terminal pinnules, partially areolate venation, non-alate pinna-rachis and arborescent habit. *H. dissimilis* has non-articulate terminal pinnules, is wholly free-veined, the pinna-rachis is

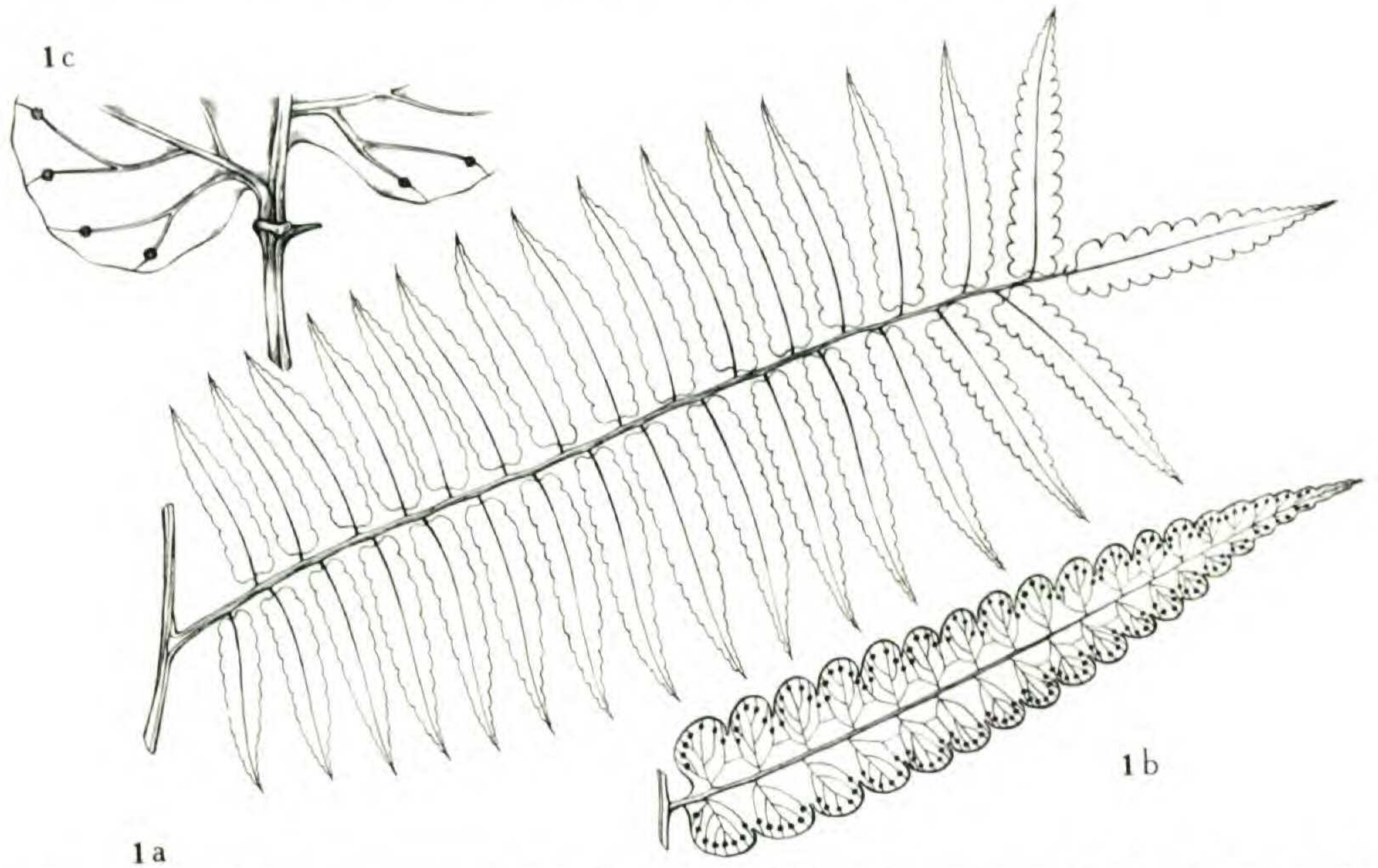


FIG. 1. *Hemitelia conformis* Tryon. 1a, pinna, X  $\frac{1}{4}$ ; 1b, pinnule, X  $\frac{2}{3}$ ; 1c, base of terminal pinnule, X  $2\frac{2}{3}$ . All from the holotype.

strongly alate, especially apically, and the stem is some 15 cm. tall.

The unusual nature of the terminal pinnule, being borne on an articulate stalk which has a lateral projection just below the joint, strongly suggests that it was a lateral pinnule that has been displaced with the abortion of the original apical portion of the pinna.

***Alsophila scopulina*, spec. nov.**

FIG. 2

Caulis juvenis erectus senior decumbens ad 30 cm. longus circa 3 cm. crassus paleaceus paleis angusto-linearibus pallide fuscis folia ad 7-45 cm. longa 3.5-14 cm. lata passim pubescentia petiolus  $\frac{1}{4}$ - $\frac{1}{3}$  laminae longitudinis ad basem paleaceus paleis angusto-linearibus integris vel rare denticulatis lamina oblongo-lanceolata acuminata herbacea pinnato-pinnatifida vel bipinnato-pinnatifida pinnae breviter petiolulatae vel sessiles venae liberae sori exindusiati paraphysati receptaculo leviter allevato 8-12 sporangiis sporangia plerumque brev-

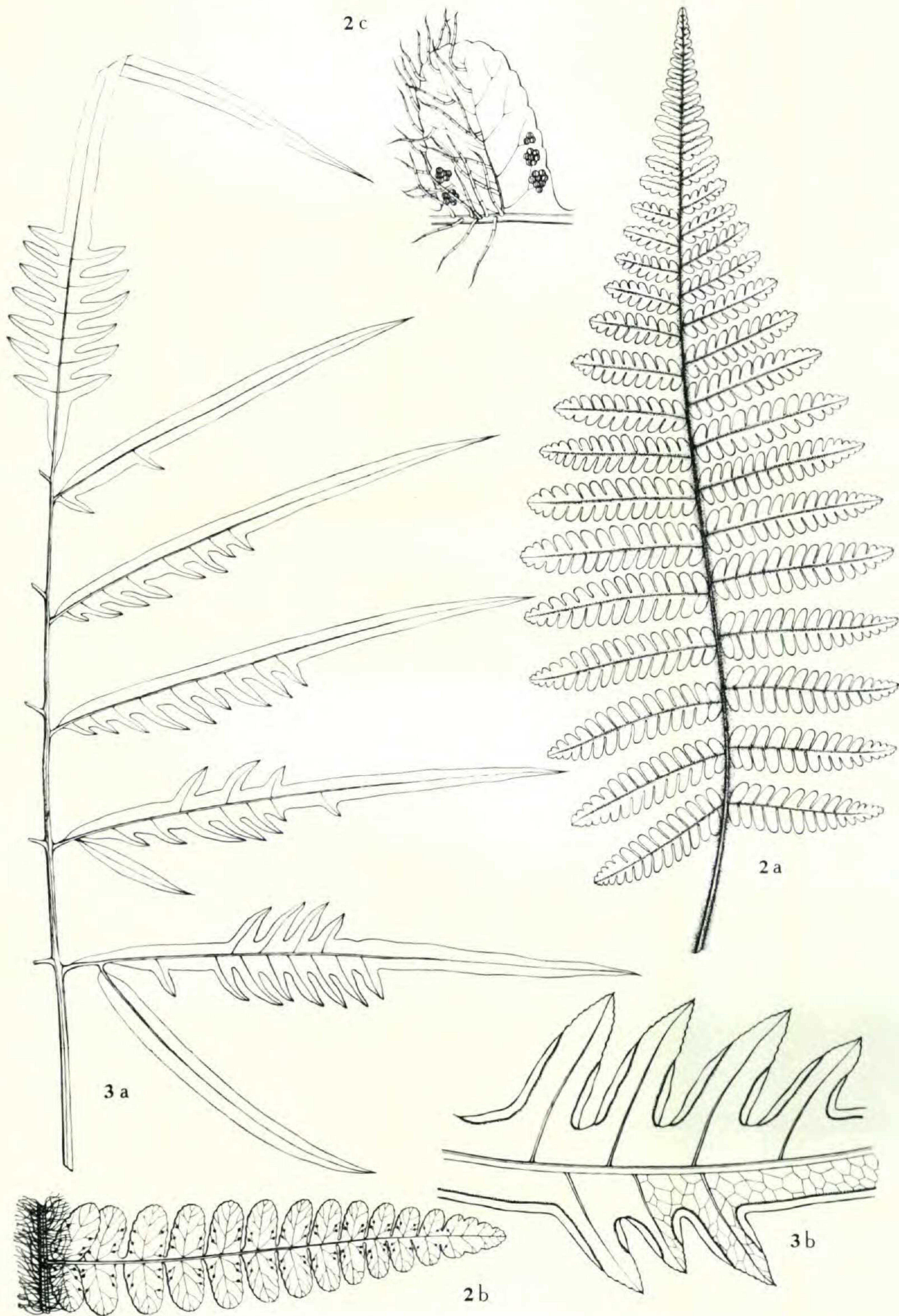


FIG. 2. *Alsophila scopulina* Tryon. 2a, lamina, X  $\frac{1}{2}$ ; 2b, pinna, X 1; 2c, ultimate segment, X 3. All from *Schultes and Cabrera 14741*; only a portion of the pubescence has been shown in each drawing. FIG. 3. *Pteris petiolulata* Tryon. 3a, fertile lamina, X  $\frac{1}{4}$ ; 3b, portion of a fertile pinna, X 1. Both from the holotype.

iter pedicellata capsula ad 0.25-0.3 mm. longa asymmetricali subglobosa spora flavae tetrahedro-globosae verrucosae.

TYPUS: Río Kananarí (affluent of Río Apaporis), in clumps on sandstone cliff, summit of Cerro Isibukuri, Vaupés, Colombia, June 8, 1951, *R. E. Schultes & I. Cabrera 13411* (GH); isotypi: (B, BM, NY, U, US). Paratypi: (from the same locality) *Schultes & Cabrera 13368* (US), *14740* (GH), *14741* (GH).

This species is very closely related to the next, *A. lechria*. The principal difference is that *A. scopulina* has all of the scales at the base of the petiole narrowly linear (the broader ones 8 cells wide) and entire or rarely sparingly dentate while *A. lechria* has some broad scales at the base of the petiole, in addition to the narrow ones. The broad scales are lanceolate-attenuate and about 20 cells wide, and these as well as the narrow ones are freely dentate or ciliate. Also the petiole is relatively short in *A. scopulina*, being one fourth to one third as long as the lamina, while in *A. lechria* it is longer, about one half as long as the lamina. The spores are of a different color in the two species but this may not be a specific character.

***Alsophila lechria***, spec. nov.

PLATE 1251

Species *A. scopulinae* valde affinis, differt petiolo ca. 1/2 laminae longitudinis paleis ciliatis vel denticulatis angusto-linearibus et lanceolatis attenuatis sporis albis. — Caulis decumbens ad 40 cm. longus circa 3 cm. crassus paleaceus paleis angusto-linearibus pallide fuscis folia ad 25-70 cm. longa 8-25 cm. lata passim pubescentia lamina lanceolata chartacea pinnato-pinnatifida vel bipinnato-pinnatifida pinnae breviter petiolulatae venae liberae sori exindusiati paraphysati receptaculo modice allevato 8-14 sporangiis sporangia plerumque breviter pedicellata capsula ad 0.25-0.3 mm. longa asymmetricali lachriformi-globosa spora albae tetrahedro-globosae verrucosae.

TYPUS: Rocky ledge, Mesa do los Santos, Dept. Santander, Colombia, 1500 m., Dec. 11-15, 1926, *E. P. Killip & A. C. Smith 15202* (GH); isotypus: (US).

The epithet is from *LECHRIOS*, oblique, in reference to the decumbent stem.

REMARKS ON ALSOPHILA. — These two new species of *Alsophila* are of considerable interest because they approach the genus *Lophosoria* in several characters. As I first studied the material of *A. scopulina* I was inclined to consider it to

represent a new genus intermediate between *Alsophila* and *Lophosoria*. However, after additional study, I believe they are better placed in *Alsophila*.

*Lophosoria* is characterized by a 6-rowed sporangial stalk



PLATE 1251 *Alsophila lechria* Tryon, from the holotype.

and a pubescent stem that is erect when young but becomes decumbent or prostrate with age, a pubescent leaf, a sorus with about 7-10 subsessile sporangia that are produced at the same time, these are borne on an essentially flat receptacle and have a large (0.4-0.5 mm. long) capsule that is somewhat asymmetrically subglobose.

The two new species resemble, or approach, *Lophosoria* in their decumbent mature stem, in their sorus with few (8-14) short-stalked sporangia that are borne on a slightly elevated receptacle and have a rather large (0.25-0.3 mm. long) capsule of rather similar shape. The sporangia of a given sorus evidently mature, and perhaps are produced, at one time. The presence of scales at the base of the petiole that are only two cells wide mixed with trichomes and broader scales is suggestive of a transitional type of indument.

*Alsophila* has a 4-rowed sporangial stalk and a paleate stem, and most species have an erect stem, broad scales at the base of the petiole (scales and trichomes may be on other parts of the leaf as well), a sorus with about 25-30 definitely stalked sporangia that are produced in a basipetal sequence, these are borne on an elevated receptacle and have a small (0.15-0.2 mm. long) capsule that is asymmetrically lachriform and somewhat laterally compressed.

The new species have the 4-rowed sporangial stalk and paleate stem and petiole base of *Alsophila*. Their other sporangial and soral characters and their narrow scales do not separate them from *Alsophila*. A survey of some 100 species of American *Alsophila* has shown that several of them depart from some of the characters previously mentioned for the genus and in these approach, or are similar to, the new species. Such species are: *A. trichiata* Maxon (the closest to *A. scopulina* and *A. lechria*), *A. microdonta* Desv., *A. stipularis* Christ, *A. ursina* Maxon, *A. villosa* (Willd.) Desv., *A. lasiosora* Mett. ex Kuhn, *A. dichromatolepis* Fée and *A. corcovadensis* (Raddi) C. Chr. Among them are found the following characters: narrow scales at the base of the petiole, a sorus with 12-16 short-stalked sporangia that are

borne on a very moderately elevated receptacle and apparently mature at one time and have a lachriform-globose capsule that is 0.3 mm. long.

Although the new species represent one extreme in the genus *Alsophila*, it is evident that they are a part of its total range of variation.

It is of interest to note that, with the exception of *A. ursina*, other small species such as *A. Gleasonii* Maxon, *A. Haughtii* Maxon, *A. Kuhnii* (Hieron.) C. Chr., *A. phalaenolepis* C. Chr. and *A. phegopteroides* Hook. show no close relationship to the two new ones.

*Cheilanthes fractifera*, spec. nov.

PLATE 1252

Species *Ch. Brandegei* valde affinis, differt paleis basalibus petiolorum latis albidis denticulatis lamina pilis multis 2-5 cellulorum. — Rhizoma breve paleis opacis fuscis concoloribus petioli propinqui fracturis supra basis post maturi lamina bipinnato-pinnatifida pinnis 5-6 jugis basalibus magnis rhachis sulcata supra basem alata segmenta lata herbacea.

TYPUS: 45 kms. from Nasca on road to Puquio, Dept. Ayacucho, Peru, 2200 m. Feb. 14, 1958, *D. S. Correll & E. E. Smith P169* (GH); isotypus: (LL). Paratypus: rocky hillside, km. 68, Carretera Central (Rimac Valley), Dist. Surco, Prov. Huarochiri, Dept. Lima, Peru, ca. 6000 ft., Jan. 1, 1954, *S. G. E. Saunders 219* (GH ex BM).

This new species differs from *Cheilanthes Brandegei* D. C. Eaton in having the lamina rather abundantly invested with 2 to 5-celled trichomes (mostly variously bent) and in having the several scales at the base of the petiole whitish, broad and with denticulate margins. *Cheilanthes Brandegei* has the lamina sparingly invested with 1-celled, straight and pointed trichomes and the scales at the base of the petiole are few, rather narrow, brown, and with entire margins.

The two species are very closely related and are similar in the following characters: rhizome scales concolorous and dull, petioles that fracture with age toward their base (one to several times), rather deltoid lamina with the basal pinnae large, rachis sulcate on the upper side and alate above the base, few nearly opposite pinnae with thin and broad ultimate segments and flattened trichomes, indusium of similar form and modification.

Such pairs of related species as *Notholaena incana* Pr. (primarily Mexico) and *Notholaena nivea* (Poir.) Desv. (primarily Andean South America) and *Cheilanthes pyra-*



PLATE 1252 *Cheilanthes fractifera* Tryon, from the holotype.

*midalis* Fée (primarily Mexico) and *Cheilanthes marginata* HBK. (Andean South America) have broader distributions



than *Cheilanthes Brandegei* (Baja California) and *Cheilanthes fractifera* (Peru) but of a similar pattern.

Two species of South Africa seem to be most closely related to these two American *Cheilanthes*. *Cheilanthes deltoidea* Kze. especially in its freely fracturing petioles and *Cheilanthes capensis* (Thunb.) Sw. in its broad thin segments and often similar lamina. The distribution of *Pellaea andromedifolia* (Kaulf.) Fée (California), *Pellaea myrtillifolia* Mett. ex Kuhn (Chile) and *Pellaea rufa* A. F. Tryon (South Africa) would be parallel to that of this *Cheilanthes* alliance.

Among other Cheilanthoid ferns the fracturing petiole is also found in *Pellaea Breweri* D. C. Eaton, *Cheilanthes rigida* (Sw.) Fée and *Cheilanthes pteridioides* (Reich.) C. Chr. This character may or may not be one that indicates phyletic relationship. It seems to be especially developed in species with leaves that have relatively thin and broad segments and that grow in relatively dry — but seasonally moist — habitats. The leaves can probably resist desiccation only slightly and once dry can not remain viable. The effective cutting off of the leaves by the breaking of the petiole may aid in the conservation of moisture in the rhizome. Most xeric ferns, on the other hand, have coriaceous leaves that not only can resist desiccation to a certain degree but evidently can also remain viable while dry for at least a short time. These can remain functional during a growing season broken by short dry periods. The former species actively grow in the xeric habitats only when they are seasonally mesic; the latter can actively grow in such habitats for a longer period of time.

*Pteris petiolulata*, spec. nov.

FIG. 3

Species *Pteris Fraseri* affinis, differt pinnis petiolulatis vel versus apicem laminarum sessilibus segmentis areolis 3-5 stichorum maximis ca. 4-6 mm. longis. — Rhizoma modice parva erecta folia circa 0.75-1.5 m. longa pinnae pubescentes praesertim in costa et marginibus plerumque integrae vel inequaliter lobatae vel pinnatifidae vel cum pinna integra marginibus sterilibus integris vel versus apicem segmentorum serrulatis costa supra sine aristis venis areolati prominentes.

TYPUS: La Merced, Dept. Junín, Peru, ca. 4000 ft., Aug. 27-Sept. 1, 1923, *J. F. Macbride 5714* (US); isotypus: (F).

*Pteris petiolulata* grows in forests at low to moderate elevations, from Venezuela to Peru. In addition to the type-collection, I have seen the following specimens: VENEZUELA: Cerro Duida, *Steyermark 57982* (US); COLOMBIA: La Cumbre, Dept. El Valle, *Killip 5844* (GH, US), 6 km. west of Medina, Dept. Cundinamarca, *Grant 10421* (US); PERU: Río Pachiri, Dept. Cuzco, *Bües 1767* (US), San Ramón, Dept. Junín, *Killip & Smith 24696* (GH, US).

The irregular development and spacing of the lobes and segments on the pinnae is suggestive of a hybrid origin but there seems to be no other evidence for it. The sporangia, the spores and their number in a sporangium appear quite normal. Although a hybrid of *Pteris grandifolia* L. and *Pteris vestita* Baker would probably be similar to *Pteris petiolulata*, *Pteris vestita* is not known outside of Peru.

This species has been confused with *Pteris Fraseri* Mett. ex Kuhn of Ecuador from which it differs principally in its stalked or sessile pinnae, its small areoles (the largest 4-6 mm. long) and the number of rows of areoles between the costa and margin, usually three rows in narrow segments and five rows in broad ones. *Pteris Fraseri* has only the basal pinnae stalked, the lamina above them is pinnatipartite, the largest areoles are 10-15 mm. long and there are usually two rows of them in narrow segments and three (rarely four) in the broadest ones.

*Pteris denticulata* Sw. of the West Indies to Brazil, Argentina and Bolivia, is related to both *Pteris petiolulata* and *Pteris Fraseri*; it differs from these in having the sterile margins serrate-spinescent, rather than entire to serrulate.

— GRAY HERBARIUM OF HARVARD UNIVERSITY.